The protective effect of field-specific and general skills against overeducation under different conditions of labour supply and demand

CHAPTER 17.

The protective effect of field-specific and general skills against overeducation under different conditions of labour supply and demand

Martin Humburg ([94]), Andries de Grip and Rolf van der Velden

Labour supply and demand imbalances lead to educational mismatch (overeducation) in the labour market. This paper explores the relationship between graduates' skills and the risk of overeducation under different labour demand and supply conditions. We distinguish two types of skills, field-specific and general skills, as well as two labour market segments, the occupational domain of a particular field of study and a general occupational domain. We find that the level of protection field-specific skills offer against the risk of overeducation increases with the degree of slack in the occupational domain of the graduate's field of study. The level of protection general skills offer against the risk of overeducation increases with the degree of slack in the general occupational domain.

17.1. Introduction

Labour supply and demand imbalances lead to educational mismatches in the labour market. When labour supply exceeds demand, workers are at risk of getting jobs for which they are (formally) overeducated. Overeducation has been shown to have negative consequences for societies as a whole, but also for the individuals concerned (Cedefop, 2010; Groot and Maassen van den Brink, 2000; McGuinness, 2006).

In this article, we make use of a unique international college graduate survey in 17 European countries to explore how overeducation is related to labour market entrants' field-specific and general skills. We thereby attempt to make inferences about how the relationship between overeducation and field-specific and general skills is influenced by conditions of labour supply and demand. Our

([94]) Corresponding author: m.humburg@maastrichtuniversity.nl
This article and other versions of it have benefited from discussions at the Second ELM conference at Maastricht University, as well as at the 2010 IAB PhD workshop in Nuremberg. The authors are grateful to Jim Allen and Ben Kriechel for their useful comments. Any errors or inaccuracies are, of course, the sole responsibility of the authors.

hypothesis is that higher job competition and selectivity in times of excess graduate supply causes the protective effect of field-specific and general skills to increase.

The remainder of this article is structured as follows: Section 17:2 presents the conceptual framework. In Section 17:3 we discuss our data and in Section 17:4 we present the results of our analysis. Section 17:5 then concludes.

17.2. Conceptual framework and hypotheses

The risk of overeducation of high and low skilled workers tends to converge in tight labour markets and diverge in slack labour markets. Models brought forward to explain why low skilled workers experience greater cyclical variation in overeducation often refer to increasing job competition or the upgrading of hiring standards during recessions. According to the job competition model (Thurow, 1975), wages are rigid, jobs are ranked according to the level of skills they require and workers are ranked according to their skills. The highest skilled worker is then assigned to the best job, the second highest skilled worker to the second best job, and this process continues until there are either no jobs or no workers left to be assigned. Economic or demographic shocks affect the length of the labour queue and the degree to which low skilled workers have to compete with high skilled workers for particular jobs. When the labour queue is longer than the job queue the low skilled at the bottom of the queue are pushed into unemployment. The occupational upgrading hypothesis (Reder, 1955) proposes a slightly different adjustment mechanism but comes to the same result as the job competition model. While the job competition model is based on the idea that employers passively hire the highest skilled worker available, the occupational upgrading hypothesis assumes that employers actively raise hiring standards in times of excess labour supply. Both models predict that jobs previously available for low skilled workers are filled with higher skilled workers in slack labour markets, pushing the former into unemployment or into jobs for which they are (formally) overeducated. Teulings and Koopmanschap (1989) show that crowding out of workers with lower levels of education by workers with higher levels of education actually took place in the Netherlands during the 1980s, yet, van Ours and Ridder (1995) argue that job competition was limited to higher versus higher vocational educated workers. Devereux (2002) finds that the mean level of education within occupations is increasing during recessions in the US and concludes that this finding is in line with the occupational upgrading hypothesis and the predictions of the job competition model. Keane and Prasad (1993) show

that workers with college degrees were protected from cyclical variation in employment in the US in the 1970s.

Traditionally, studies interested in the differences in the cyclicality of labour market outcomes such as employment and job quality have defined skills as years of schooling or the level of education ([95]). In this article, we are interested in what happens to the risk of overeducation of graduates from higher education if an economic or demographic shock hits the labour market. We therefore focus on skill components that distinguish graduates with the same level of education. We hold the level of education fixed (higher education) and distinguish two types of skills, field-specific and general skills. These skill types have been shown to affect the transition from education to work in terms of wages and the risk of unemployment ([96]), as well as the risk of overeducation ([97]).

Besides distinguishing two skill types, we distinguish two labour market segments: the occupational domain of a particular field of study and the general occupational domain. We assume that a graduate's rank in the occupational domain of his particular field of study is based on his field-specific skills. This labour market segment contains occupations, which require a very specific set of skills, such as medical doctors, pilots, or engineers. In the occupational domain of a particular field of study, field-specific skills are the dominant factor for labour market success because they are instantly deployable and are associated with low costs for further field-specific training. Alternatively, graduates have the choice to work in the general occupational domain. We assume that a graduate's rank in the general occupational domain is based on his general skills. This is because the occupations contained in this labour market segment are broad in nature and require graduates to have low general training costs. Examples of general jobs are trainee programmes in large firms, managing positions or general administrative positions.

The segmentation into a labour market where more field-specific skills are required and a labour market where more general skills are required has important implications for the formulation of our hypotheses. Shocks taking place in the field-specific labour market will affect the relationship between field-specific skills and labour market outcomes whereas shocks in the general labour market will affect the relationship between general skills and labour market outcomes.

([95]) Devereux (2002); Keane and Prasad (1993); Okun (1981); Teulings and Koopmanschap (1989); van Ours and Ridder (1995).

([96]) Bishop (1995); Campbell and Laughlin (1991); Goux and Maurin (1994); Heijke et al. (2003); Kang and Bishop (1989); Mane (1999); Payne (1995); Ryan (2001).

([97]) Chevalier and Lindley (2009); Verhaest and van der Velden (2010).

When the number of jobs at the tertiary level in the occupational domain of a particular field of study is lower than the number of graduates in this field, due to an economic and/or demographic shock, graduates with the least field-specific skills will not necessarily become unemployed, but they will tend to stream into jobs previously available for medium educated workers of that field. One should therefore be able to observe that the comparative advantage of having high as opposed to low field-specific skills increases with the degree of slack in the labour market. The same mechanism is at work in the occupational domain demanding more general skilled workers. When the degree of slack in these general occupations increases, employers will fill their vacancies with the best workers available and more and more graduates with low levels of general skills will accept jobs previously available for medium educated workers. When aggregate unemployment increases, one should therefore observe an increase in the comparative advantage of having high as opposed to low general skills.

17.3. Data

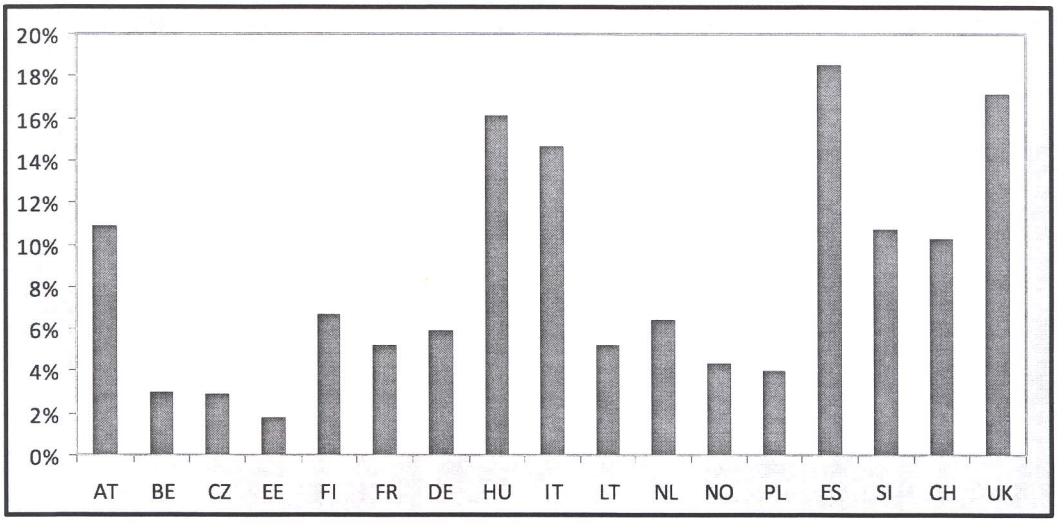
Figure 17:1 shows that even among college graduates the risk of overeducation is substantial. Our analysis is based on original and representative data from the Reflex and Hegesco surveys among graduates from 17 European countries ([98]). The questionnaire was sent to higher education graduates five years after graduation. Our sample contains 11129 individuals.

In the questionnaire, respondents were asked to rate their skill level on a scale from 1 (very low) to 7 (very high). 'Mastery of own field or discipline' refers to graduates' level of theoretical and practical knowledge in their own field and to the ability to apply this knowledge in practice. We use this skill as an indicator for field-specific skills. 'Analytical thinking' refers to the ability to generalise from a concrete problem to abstract ideas, and to manipulate these ideas in one's mind

([98]) Reflex was conducted in 2005 among 15 European countries and Japan. Hegesco is the extension of Reflex to four new EU Member States and Turkey conducted in 2009. In our analysis we only focus on European countries to ensure comparability. We excluded Sweden and Portugal because their survey design substantially deviated from the rest of the survey. For the remaining countries, we only include individuals who were less than 36 years old at the time of the survey to avoid unobserved pre-university labour market experience to be influencing the results. Moreover, we exclude all individuals who were not living or working in their home country at the time of the survey or who enrolled in further education after the initial education they reported on. The number of observations per country varies between 382 and 995.

to arrive at a solution, not only to the original problem, but to a whole class of similar problems. This skill matches our definition general skills quite well.

Figure 17:1 **Incidence of overeducation among college graduates five years after graduation (%)**



Source: Own calculations on the basis of Reflex and Hegesco data set. Data of Hungary, Lithuania, Poland and Slovenia from 2009, the rest of the countries from 2005.

Our definition of the dependent variable is straight forward. We consider graduates overeducated if they indicated that the type of education most appropriate for the job they are doing is below the tertiary level ([99]).

We use the unemployment rate at the time of the surveys as a proxy for labour market conditions. We include two different unemployment rates in our regression: the unemployment rate of the respondent's country (overall unemployment rate) as well as the unemployment rate of the respondent's field of study within that country (unemployment rate of the occupational domain of the field of study). Both unemployment rates are calculated on the basis of the combined Reflex and Hegesco data. Their values per country and field of study are displayed in Table 1 ([100]). Using international variation for the identification of

([99]) For a discussion on measurement issues in assessing overeducation, see Dolton and Vignoles (2000) and Hartog (2000).

([100]) In the regressions, we include the unemployment rate in the occupational domain of a particular field of study (the field-specific unemployment rate within a country) as the deviation from the overall unemployment rate (the country-level unemployment rate), and we include the overall unemployment rate as the deviation from the unemployment rate of the whole sample. This ensures that both unemployment rates are uncorrelated and has advantages concerning the interpretation of the regression results as pointed out in Section 17:4.

effects of skills and their interaction with labour market conditions has advantages over national studies but also obvious limitations (Cedefop, 2010). The main advantage is that measures generated from international data offer variation usually unavailable within a single country and provide insights into long-term, general equilibrium effects. A clear limitation of cross-country, cross-field evidence is possible omitted country-level and field-level variables, such as institutional differences in ability sorting or employers' beliefs.

As control variables we only use variables which influence the probability of being overeducated because of signalling or network effects but which are not necessarily outcomes of skills. We include gender, age, age squared, a dummy whether the father has higher education, a dummy whether the respondent has a second level higher education degree ([101]), a dummy whether the respondent had study-related work experience during higher education and a dummy whether the respondent had non study-related work experience during higher education.

17.4. Results

Figure 17:2 shows a scatter plot of the coefficient of general skills and the overall unemployment rate. The coefficients were obtained by countrywise regressing a dummy variable that takes the value 1 if individuals are overeducated on general skills and the set of control variables described above. The fitted line suggests that the protective effect of general skills against overeducation is higher when aggregate unemployment is higher.

Figure 17:3 presents a scatter plot of the coefficient of field-specific skills and the unemployment rate of the occupational domain of the field of study. The coefficients were obtained by regressing a dummy 1 if overeducated on field-specific skills and a set of control variables per field of study. The fitted line suggests that the protective effect of field-specific skills against overeducation is higher when unemployment in the occupational domain of the field of study is higher.

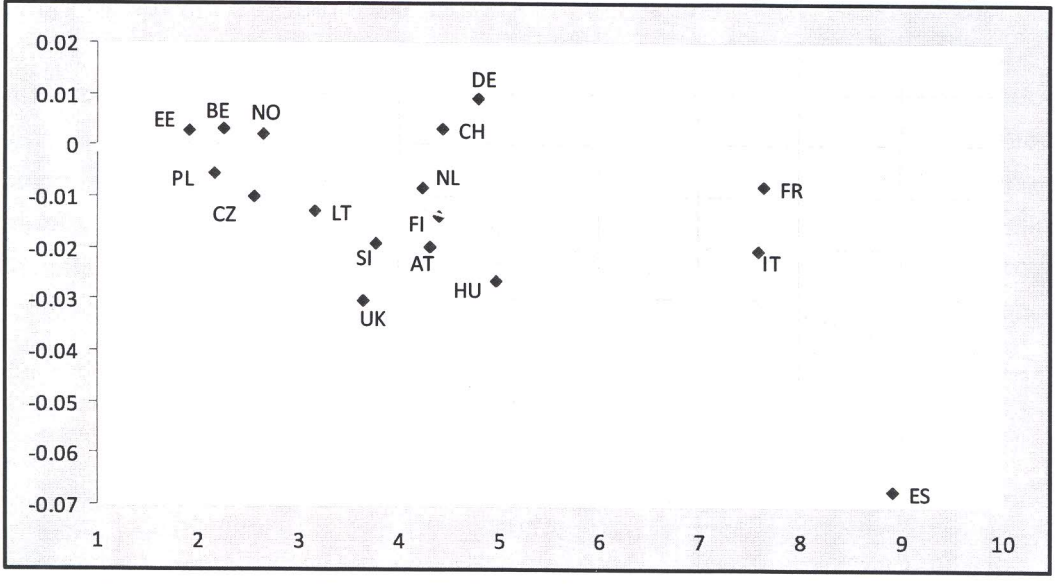
([101]) A second level higher education degree is a degree at ISCED 5A allowing direct access to doctoral studies.

Table 17:1 **Overall unemployment rates and unemployment rates in the occupational domain of particular fields of study per country**

	Mean	E	HA	SJI	BL	SMC	EMC	AV	HW	S
AT	4.3	2.4	6.1	4.4	4.5	3.6	3.2	5.8	4.8	3.7
BE	2.2	1.9	3.3	2.2	1.1	3.0	2.0	2.1	1.2	1.9
CZ	2.6	3.1	3.9	1.6	1.9	2.6	2.1	2.5	2.6	2.1
EE	1.9	1.0	2.3	1.7	1.2	1.2	1.1	2.3	2.4	2.5
FI	4.4	4.4	4.9	3.3	4.0	4.1	3.1	3.5	5.8	6.5
FR	7.6	6.6	10.5	8.7	8.2	9.7	5.7	7.2	5.9	7.5
DE	4.8	4.7	5.9	4.7	4.1	7.3	4.6	4.1	3.8	4.0
HU	5.0	6.7	4.2	5.3	4.9	4.6	4.5	4.9	4.1	5.9
IT	7.6	9.0	10.2	9.1	7.4	8.4	3.6	8.1	6.6	7.4
LT	3.2	3.8	4.4	2.7	2.7	2.8	2.7	-	2.9	3.0
NL	4.2	2.6	6.0	4.0	3.6	6.1	3.5	4.7	2.8	4.1
NO	2.7	2.4	3.3	3.0	2.1	2.5	2.2	2.6	2.1	3.1
PL	2.2	3.3	2.0	1.5	2.1	2.3	1.7	2.0	1.8	1.8
ES	8.9	9.8	12.5	9.9	7.8	10.3	5.1	11.3	7.5	8.0
SI	3.8	3.9	4.1	3.3	3.6	3.5	2.4	5.1	1.6	5.4
CH	4.4	3.6	5.2	5.3	4.2	6.4	3.2	4.3	3.1	-
UK	3.6	2.7	5.6	3.5	3.3	2.6	3.8	4.0	2.5	3.8

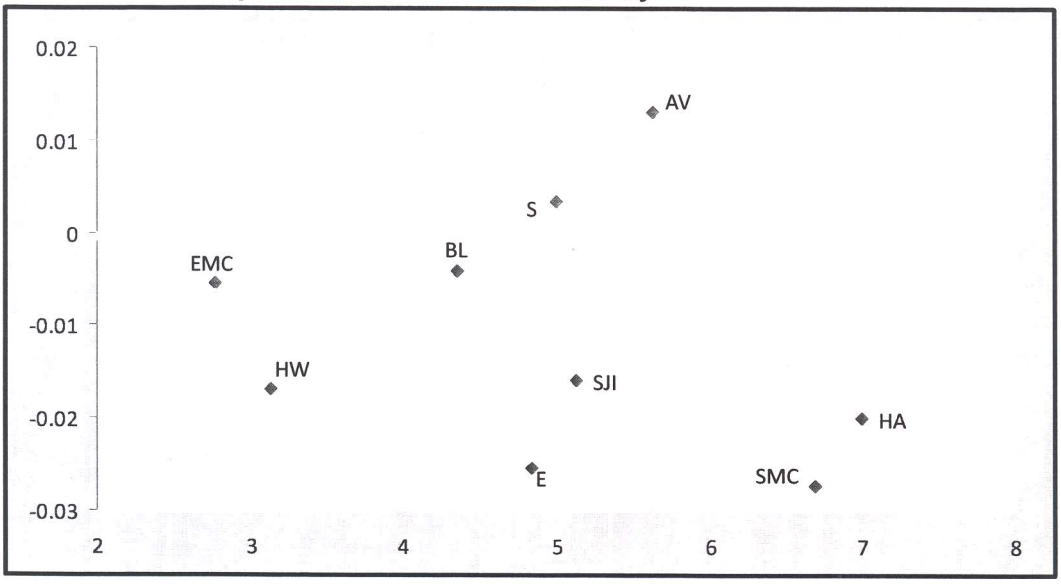
NB: Values are posterior means derived from Reflex/Hegesco data. E=Education, HA=Humanities and Arts, SJI=Social Sciences, Journalism and Information, BL=Business, Law, SMC=Science, Mathematics and Computing, EMC=Engineering, Manufacturing and Construction, AV=Agriculture and Veterinary, HW=Health and Welfare, S=Services.

Figure 17:2 **Coefficient of general skills and overall unemployment rate (%)**



Data: Reflex and Hegesco. AT=Austria, BE=Belgium, CH=Switzerland, CZ=Czech Republic, DE=Germany, EE=Estonia, ES=Spain, FI=Finland, FR=France, HU=Hungary, IT=Italy, LT=Lithuania, NL=Netherlands, NO=Norway, PL=Poland, SI=Slovenia, UK=United Kingdom.

Figure 17:3 **Coefficient of field-specific skills and unemployment rate in occupational domain of field of study**



Data: Reflex and Hegesco. E=Education, HA=Humanities and Arts, SJI=Social Sciences, Journalism and Information, BL=Business, Law, SMC=Science, Mathematics and Computing, EMC=Engineering, Manufacturing and Construction, AV=Agriculture and Veterinary, HW=Health and Welfare, S=Services.

The regression results presented in Table 17:2 confirm that these relationships are statistically significant. Model 1 shows that, on average, both skill types are negatively related to the probability of being overeducated ([102]). Holding all other things constant, a one standard deviation higher endowment of field-specific skills reduces the risk of being overeducated by 1.3%. A one standard deviation higher endowment of general skills reduces the risk of being overeducated by 1.7%. Both unemployment rates are positively related to the probability of being overeducated for one's job. Moreover, as expected, both the coefficient of the interaction of general skills (analytical thinking) and the overall unemployment rate as well as the coefficient of the interaction of field-specific skills (mastery of own field) and the unemployment rate in the occupational domain of the field of study are negative and significant at the 1% level in model 2. This indicates that when the degree of slack in the general occupational

([102]) We also tested if graduates working in jobs that match their level of education have higher skills because they receive more training than those who are overeducated (van Smoorenburg and van der Velden, 2000). We therefore reran our estimation once with hours of training in the past four weeks and once with a dummy indicating the participation in training in the last 12 months to take account of the effect of training on skills. Including these variables did not substantially change the coefficients of our variables of interest, indicating that our skill variables are not picking up training effects.

domain increases, the level of protection against the risk of overeducation general skills offer graduates also increases.

Table 17:2 **Linear probability model of being overeducated five years after graduation**

	Model 1	Model 2
Mastery of own field (standardised)	-0.013***	-0.014***
	(0.003)	(0.003)
Analytical thinking (standardised)	-0.017***	-0.019***
	(0.003)	(0.003)
Overall unemployment rate	0.016***	0.016***
	(0.001)	(0.001)
Unemployment rate in occupational domain of field of study	0.013***	0.013***
	(0.003)	(0.003)
Overall unemployment rate X Analytical thinking		-0.007***
		(0.002)
Unemployment rate in occupational domain of field of study X Mastery of own field		-0.008***
		(0.003)
Controls	yes	yes
R^2	0.040	0.043
N	11 129	11 129

NB: Coefficients reported are estimates from a linear regression of a dummy 1 if overeducated on our independent variables, robust standard errors in parentheses
(significance levels *** 0.01, ** 0.05, * 0.1).
Controls included are gender, age, age squared, father having higher education, respondent having a second level degree, study related work experience during higher education, and non study related work experience during higher education.
Data: Reflex/Hegesco.

Moreover, the level of protection against the risk of overeducation field-specific skills offer graduates increases when the unemployment rate in the occupational domain of the field of study rises.

17.5. Conclusion

In this article, we investigated the relationship between graduates' field-specific and general skills and the risk of being employed in a job for which they are overeducated.

One of the main arguments brought forward by this paper is that two labour market segments can be distinguished: a labour market segment where field-specific skills determine the allocation of graduates to jobs (the occupational domain of a particular field of study) and a labour market segment where general skills determine the allocation of graduates to jobs (the general occupational domain). From this followed that heterogeneity concerning the effect of field-

specific skills on overeducation should stem from variation in excess supply of graduates in the occupational domain of the corresponding field of study whereas heterogeneity concerning the effect of general skills on overeducation should stem from variation in excess supply of graduates in the general occupational domain.

We found that graduates with low levels of field-specific or general skills experience greater cyclical variation in job quality (overeducation). More precisely, the probability of being overeducated of graduates with high and low levels of field-specific skills converges when unemployment in the occupational domain of the field of study is low and diverges when the degree of slack in this specific labour market segment rises. The probability of being overeducated of graduates with high and low levels of general skills converges when overall unemployment is low and diverges when general unemployment rises.

Besides looking at differences in the cyclical employment and job quality variation between graduates with different skill endowments, we explored the average relationship between field-specific and general skills and graduates' probability of being overeducated. Our study showed that skills matter. Graduates with high field-specific skills as well as graduates with high general skills (or both) were more often allocated to jobs matching their level of education than graduates with low levels of field-specific and general skills.

The results of our study are encouraging. We realise, however, that the effects we find could be driven by institutional differences between countries or fields of study. We therefore think that using cross-sectional data to test our conceptual framework can only be a first step. Further research exploiting cyclical variation within fields and within countries over time is needed to better establish causality.

References

Bishop, J. (1995). *Expertise and excellence*. Ithaca, NY: Cornell University (CAHRS Working paper series; 95-13).

Campbell, P.B.; Laughlin, S. (1991). *Participation in vocational education: an overview of patterns and their outcomes*. Columbus, OH: National centre for research in vocational education.

Cedefop (2010). *The skill matching challenge: analysing skill mismatch and policy implications*. Luxembourg: Publications Office of the European Union.

Chevalier, A.; Lindley, J. (2009). Overeducation and the skills of UK graduates. *Journal of the Royal statistical society*, Series A (Statistics in society), Vol. 172, No 2, p. 307-337.

Devereux, P.J. (2002). Occupational upgrading and the business cycle. *Labour*, Vol. 16, No 3, p. 423-452.

Dolton, P.; Vignoles, A. (2000). The incidence and effects of overeducation in the UK graduate labour market. *Economics of education review*, Vol. 19, No 2, p. 179-198.

Goux, D.; Maurin, E. (1994). Éducation, expérience et salaire: tendances récentes et évolution de long terme *[Education, experience and earnings: recent trends and long-term developments]. Économie et Prévision*, Vol. 116, No 5, p. 155-178.

Groot, W.; Maassen van den Brink, H. (2000). Overeducation in the labour market: a meta-analysis. *Economics of education review*, Vol. 19, No 2, p. 149-158.

Hartog, J. (2000). Over-education and earnings: where are we, where should we go? *Economics of education review*, Vol. 19, No 2, p. 131-147.

Heijke, H. et al. (2003). Fitting to the job: the role of generic and vocational competences in adjustment and performance. *Labour economics*, Vol. 10, No 2, p. 215-229.

Kang, S.; Bishop, J. (1989). Vocational and academic education in high school: complements or substitutes? *Economics of education review*, Vol. 8, No 2, p. 133-148.

Keane, M.; Prasad, E. (1993). Skill levels and the cyclical variability of employment, hours, and wages. *IMF staff papers*, Vol. 40, No 4, p. 711-743.

Mane, F. (1999). Trends in the payoff to academic and occupation-specific skills: the short and medium run returns to academic and vocational high school courses for non-college-bound students. *Economics of education review*, Vol. 18, No 4, p. 417-437.

McGuinness, S. (2006). Overeducation in the labour market. *Journal of economic surveys*, Vol. 20, No 3, p. 387-418.

Okun, A.M. (1981). *Prices and quantities: a macroeconomic analysis.* Washington DC: The Brookings Institution.

Payne, J. (1995). *Options at 16 and outcomes at 24: a comparison of academic and vocational education and training routes.* Sheffield: Dept. for Education and Employment (Youth Cohort report series; No 35).

Reder, M.W. (1955). The theory of occupational wage differentials. *The American Economic Review*, Vol. 45, No 5, p. 833-852.

Ryan, P. (2001). The school-to-work transition: a cross-national perspective. *Journal of economic literature*, Vol. 39, No 1, p. 34-92.

Teulings, C.; Koopmanschap, M. (1989). An econometric model of crowding out of lower education levels. *European economic review*, Vol. 33, No 8, p. 1653-1664.

Thurow, L. C. (1975). *Generating inequality*. New York: Basic Books.

van Ours, J.C.; Ridder, G. (1995). Job matching and job competition: are lower educated workers at the back of job queues? *European economic review*, Vol. 39, No 9, p. 1717-1731.

van Smoorenburg, M.S.M.; van der Velden, R.K.W. (2000). The training of school-leavers: complementarity or substitution? *Economics of education review*, Vol. 19, No 2, p. 207-217.

Verhaest, D.; van der Velden, R.K.W. (2010). Cross-country differences in graduate overeducation and its persistence. *Research memoranda*, No 7. Maastricht: ROA, Research centre for education and the labour market.